APPENDIX O1-B

STORMWATER DESIGN DECISION, TREATMENT OF RUNOFF FROM NEW IMPERVIOUS SURFACES

I-405, SR520 to SR522 Stage 1 (Kirkland Stage 1)

Draft RFP
March 22, 2005

Washington State Department of Transportation

INTERSTATE 405 Project Team
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Stormwater Design Decision
Treatment of Runoff From New Impervious Surfaces
Kirkland Nickel Project

July 23, 2004

Washington State
Department of Transportation

Introduction

The purpose of this paper is to define "new", "replaced" and "effective" impervious surfaces for purposes of determining and calculating minimum treatment requirements for storm water runoff within the Kirkland Nickel Project.

Background

The Kirkland Nickel Project drainage design is in accordance with the WSDOT Highway Runoff Manual (HRM), March 2004. Minimum runoff treatment requirements are selected using the flow chart procedure listed on page 2-3 of the HRM. The HRM procedures requires that the project existing, new and replaced pavement surface areas (impervious areas) be measured. The minimum runoff treatment requirements are first selected on a project area basis to decide which of the HRM's nine minimum requirements are applicable. If the project area has more than the minimum of 5,000 sq. ft. of new impervious area, then the new pavement must be treated with both quality and quantity controls. If the new impervious surface is more than 50% of the existing impervious surface then both the new and replaced impervious surfaces must be treated.

The Kirkland Nickel Project has over 5,000 square feet of new impervious area so minimum requirements 1 through 9 apply to the new pavement. However, the new pavement surface adds only about 17% of existing pavement surface so replaced pavement does not need to be treated.

The HRM then looks at the individual threshold discharge areas (TDAs) to decide whether the minimum runoff treatment requirements determined for the project wide basis need to be used at the TDA level. If the new pollution generating impervious surface (for Kirkland Nickel this is the same as the new pavement area since we do not have greater than 50% new pavement) is 5,000 square feet or greater within a given TDA, then minimum requirement no. 5, Runoff Treatment is applied to the new pavement areas in that TDA. If the new impervious area is 5,000 square feet or more in a given TDA, then minimum requirement no. 6, Flow Control is applied to the new pavement areas in that TDA.

In summary, several of the Kirkland Nickel Project TDA's will have minimal new pavement added (less than 5,000sf), where minimum HRM requirements for runoff quality treatment and flow control do not need to be applied. Where the minimum thresholds are met in the other TDAs the new pavement areas tend to be small widened slivers and the required runoff treatment facilities are relatively small (as compared to a full rebuild type of highway project).

This above procedure generally follows the same requirements outlined in the Washington Department of Ecology Stormwater Management Manual for Western Washington dated

August, 2001 (SMMWW). Although there are some differences in allowable minimum disturbance areas between the two manuals, the same basic conclusions on applying minimum runoff treatment requirements will be reached using ether the HRM or the SMMWW if the same definitions of "new", "replaced" and "effective" impervious surfaces are used.

To date there have been a number of differing interpretations made by members of the I-405 team and the WSDOT HQ Hydraulics Office as to how to apply and model the runoff from the "new", "replaced" and "effective" impervious surfaces. This has resulted in several drainage design iterations and revisions based on both discipline team discussions as well as higher level technical review comments. The WSDOT HQ Hydraulics Office (Alex Nguyen) has recently held discussions with DOE (*Ed O'Brien)* clarifying the usage of the terms "new", "replaced" and "effective" as follows:

- New Impervious Surface – For the Kirkland Nickel Project, this would be the new widened pavement area, the new pavement outside of the existing pavement cross-section beyond the existing edge of shoulder. This is new pavement covering existing pervious area. New impervious surfaces are also those gravel surfaces that are upgraded to ACP or PCCP. For the general case, the new impervious surfaces could also be the new pollution generating impervious areas with the exception of road separated bike paths and sidewalks.
- Replaced Impervious Surface –This is existing pavement that is removed into bare soil and a new pavement section installed. For the Kirkland Nickel Project, the replacement of existing shoulders with full depth pavement is considered replaced pavement. (Note: Grinding and repaving operations are not considered replaced pavement).
- Effective Impervious Surface – For the Kirkland Nickel Project this is the same surface area as the New Impervious Surface. If on another project the amount of new pavement were to be greater than 50% of existing pavement, then you would add the replaced pavement quantity to the new pavement quantity to find the impervious surface requiring treatment.

The above definitions of terms was passed on to thel-405 drainage discipline team from Alex Nguyen in a meeting held on July 12, 2004, and further clarified in a telephone conversation on July 20th. Based on these clarifications, the I-405 drainage designers will proceed with finalizing the Kirkland Nickel Project drainage concepts wherein the final treatment modeling will be providing runoff quality and quantity treatment only for the "new" pavement as defined above, per the requirements for minimum treatment listed in the HRM. In effect, the runoff treatment will utilize the following constraints:

- Quantity (flow control) treatment will be modeled for the new impervious area only. In some threshold discharge areas (TDAs) there is less than the minimum required new pavement area of 5,000 square feet and no flow control treatment will be required. Equivalent area calculations will be used to place detention facilities at locations that minimize new conveyance pipes and ditches, and the resulting disturbance of

existing pavement. Infiltration will also be used wherever possible to reduce detention structure sizes.

- Quality treatment will be modeled for the new impervious area only. Every effort will be made to treat the new pavement areas directly. However equivalent area modeling may have to be done at some locations where it is impossible to catch the new pavement runoff without installing a new collection system.
- Quality treatment facilities at times may be sized not only for runoff from the new impervious surface but may include other off-site, corridor pervious area, existing impervious surface, or replaced impervious surface runoff that is mixed into the new pavement runoff. This will in effect, retrofit treatment for a portion of the existing and /or replaced pavement surface. The actual areas of new, existing and replaced pavement surfaces where runoff is actually collected and treated will be measured and quantified in the project hydraulic report and appropriate environmental discipline reports.

Summary

This paper concludes the Kirkland Nickel Project will define "new impervious surface" as new pavement that will cover existing pervious area, widened outside of the existing edge of shoulder; "replaced impervious surface" as existing pavement removed into bare soil and replaced with a new pavement section; and "effective impervious surface" is the same area as the new impervious surface. These definitions are for purposes of determining the HRM minimum runoff treatment requirements to be used for the Kirkland Nickel Project. This definition is summarized on the attached standard roadway sections drawing, Exhibit 1.

This decision was based on information gathered dealing with the following main factors:

- The design direction given by Alex Nguyen, WSDOT HQ Hydraulics Engineer and his discussions with DOE.
- The same clarifications will be formalized criteria in the next HRM update.
- The need to finalize the drainage concept to fit within the Kirkland Nickel Project's aggressive permitting and contract award schedule.

Further, Alex Nguyen will work to update the current HRM to clarify areas noted above such as the definition of effective impervious surface and clarifying the triggers listed in minimum requirements 5 and 6. Based on Alex's conversations with Ed Obrien, DOE feels that their manual is already clear, thus not requiring any modifications.

Decision Summary

Based on this paper's above discussion, the determination has been made to have the Kirkland Nickel Project to use the definition of "new impervious surface" as being the area of new pavement outside of the existing pavement footprint; "replaced impervious surface" as existing pavement removed into bare soil and replaced with a new pavement section; and "effective impervious area" as the same pavement area as the new impervious surface for

purposes of determining stormwater treatment minimum requirements. It is also determined that in using these definitions, there should be little risk that the resultant runoff treatment facilities developed using the HRM procedures, will differ notably from facilities developed using the DOE Stormwater Management Manual for Western Washington (through the time period of the Kirkland Nickel Project RFP development).

Concurring Approvals:

Alex Nguyen — 8/30/04 Date

Matt Witecki — 8/24/04 Date

Attachments : Exhibit 1.

ATTACHMENT:

Exhibit 1, Typical Pavement Sections Showing Definition of New Pavement for Purposes of Determining Minimum Runoff Treatment Requirements for the Kirkland Nickel Project. (click on the embedded icon to open and print)

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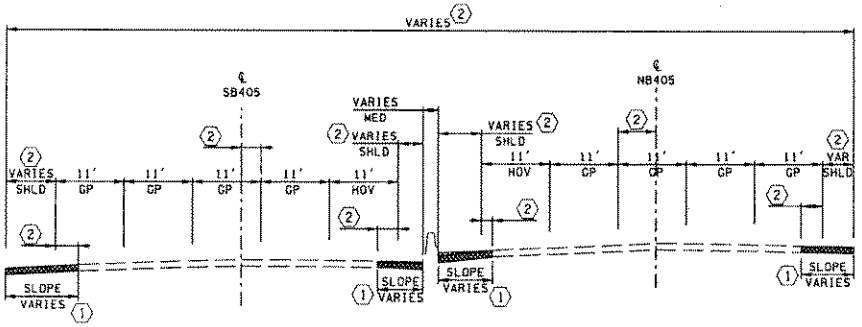
405ProjCad\000\user



I-405 - NB 4 GP & 1 HOV LANE, SB 4 GP & 1 HOV LANE
RESTRIPE LANES REPLACE SHOULDERS, DEVIATED SECTION

SB405 STA 4144+20 TO STA 4148+10 (3)
SB405 STA 4224+14 TO STA 4227+90
NB405 STA 4140+20 TO STA 4141+40 (3)

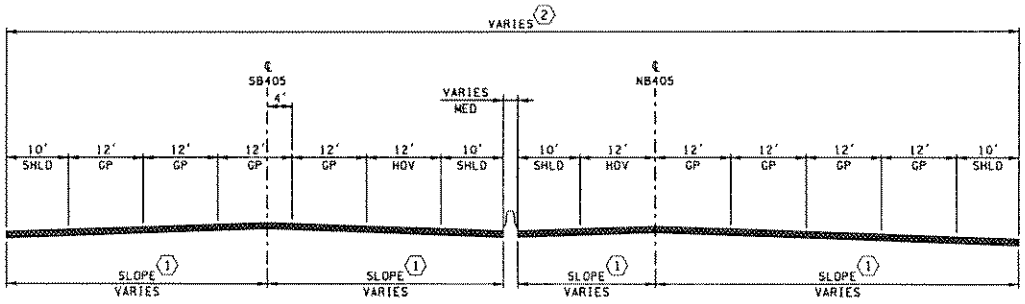
NOTES

(1) MATCH EXISTING SLOPE OF TRAVELED WAY

(2) DISTANCE VARIES, SEE PAVING PLAN SHEETS FOR DETAILS

(3) 4 GP, 1 HOV & 1 AUX LANE BETWEEN NE 70TH ST. AND NE 85TH ST.

REMOVE AND REPLACE EXISTING PAVEMENT



I-405 - NB 4 GP & 1 HOV LANE, SB 4 GP & 1 HOV LANE
FULL REPLACEMENT SECTION

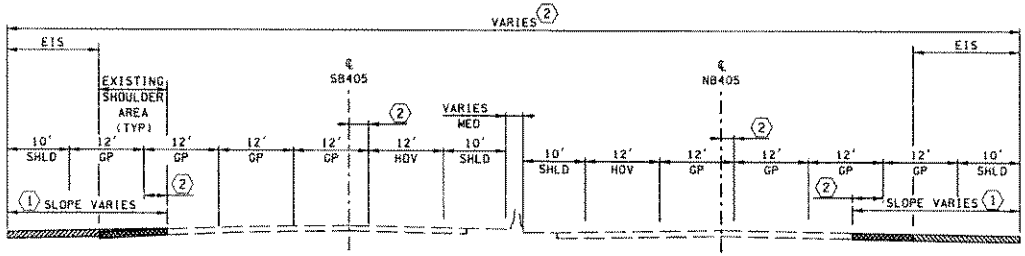
SB405 STA 4200+36 TO STA 4224+14
NB405 STA 4190+85 TO STA 4225+10

NOTES

(1) SUPERELEVATION VARIES

(2) DISTANCE VARIES, SEE PAVING PLAN SHEETS FOR DETAILS

REMOVE AND REPLACE EXISTING PAVEMENT



I-405 - NB 4 GP & 1 HOV LANE, SB 4 GP & 1 HOV LANE
WIDEN PAVEMENT, FULL STANDARD SECTION

SB405 STA 4148+10 TO STA 4200+36
NB405 STA 4141+40 TO STA 4190+85
NB405 STA 4225+10 TO STA 4228+80

NOTES

(1) MATCH EXISTING SLOPE OF TRAVELED WAY

(2) DISTANCE VARIES, SEE PAVING PLAN SHEETS FOR DETAILS

REMOVE AND REPLACE EXISTING PAVEMENT

NEW PAVEMENT

Drainage Notes:

1. "New Impervious Surface" is defined as the new pavement (Widened area beyond the existing shoulder) as shown on this drawing for purposes of applying minimum treatment requirements per procedure on page 2-3 of the WSDOT Highway Runoff Manual, March, 2004 (HRM).

2. The effective impervious surface (EIS) is used to determine if HRM minimum requirement no. 6 (flow control) is applied at a threshold discharge area (TDA) level (page 2-24, HRM). Typically, the shown EIS is also the effective pollution generating impervious surface (EPGIS) that is used to determine if HRM minimum requirement no. 5 (quality treatment) is applied at a TDA level (page 2-14, HRM).

3. For Kirkland Nickel Project where new impervious surface area is < 50% of existing impervious surface, flow control calculations are based on the "New Impervious Surface" as defined in drainage note 1. Quality treatment calculations are based on the EPGIS, plus any existing impervious surface, off-site and pervious ROW area flows that are mixed in with the new impervious surface runoff flows.

EIS = Effective Impervious Surface (typically can also be the Effective Pollution Generating Impervious Surface). See drainage note 2.

STORMWATER DESIGN DECISIONS
TREATMENT OF RUNOFF FROM NEW IMPERVIOUS SURFACES

EXHIBIT 1,
NEW AND REPLACED PAVEMENT
JULY, 2004

FILE NAME C:\pwworking\dms02153\Drainage_Section_Exhibit.dgn					
TIME 3:09:29 PM				REGION NO. / STATE	FED.AID PROJ.NO.
DATE 7/14/2004				10 / WASH	
PLOTTED BY chriss				JOB NUMBER	
DESIGNED BY X.XXXXXXXXXXXXXX				CONTRACT NO.	LOCATION NO.
ENTERED BY X.XXXXXXXXXXXXXX					
CHECKED BY X.XXXXXXXXXXXXXX					
PROJ. ENGR. X.XXXXXXXXXXXXXX					
REGIONAL ADM. X.XXXXXXXXXXXXXX	REVISION	DATE	BY		

P.E. STAMP BOX DATE

P.E. STAMP BOX DATE

INTERSTATE 405 Project Team
Washington State Department of Transportation

I-405 CONGESTION RELIEF & BUS RAPID TRANSIT PROJECTS
KIRKLAND NICKEL
STAGE 1

ROADWAY SECTIONS

SHEET OF XXX SHEETS